FIG. 1

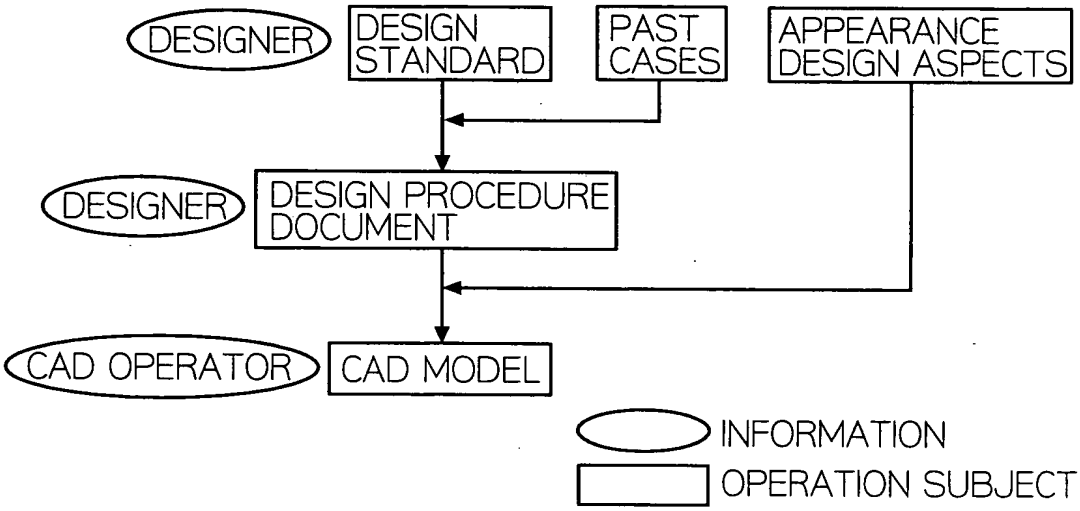

DESIGNER
DESIGN STANDARD
PAST CASES
APPEARANCE DESIGN ASPECTS
DESIGNER
DESIGN PROCEDURE DOCUMENT
CAD OPERATOR
CAD MODEL
INFORMATION
OPERATION SUBJECT

FIG. 2

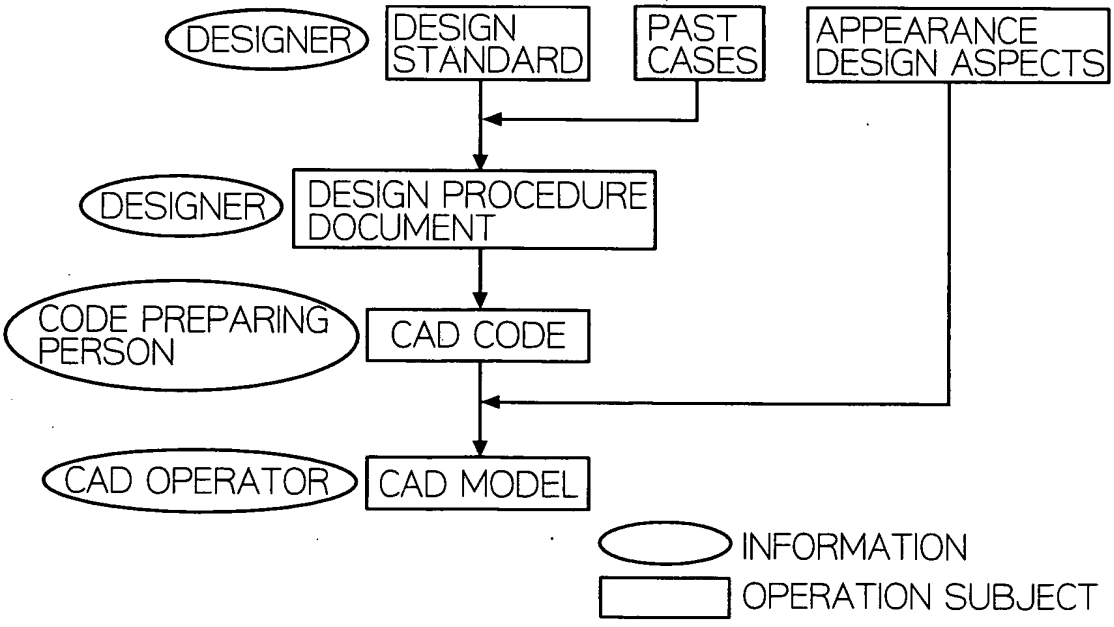

DESIGNER
DESIGN STANDARD
PAST CASES
APPEARANCE DESIGN ASPECTS
DESIGNER
DESIGN PROCEDURE DOCUMENT
CODE PREPARING PERSON
CAD CODE
CAD OPERATOR
CAD MODEL
INFORMATION
OPERATION SUBJECT

FIG. 3

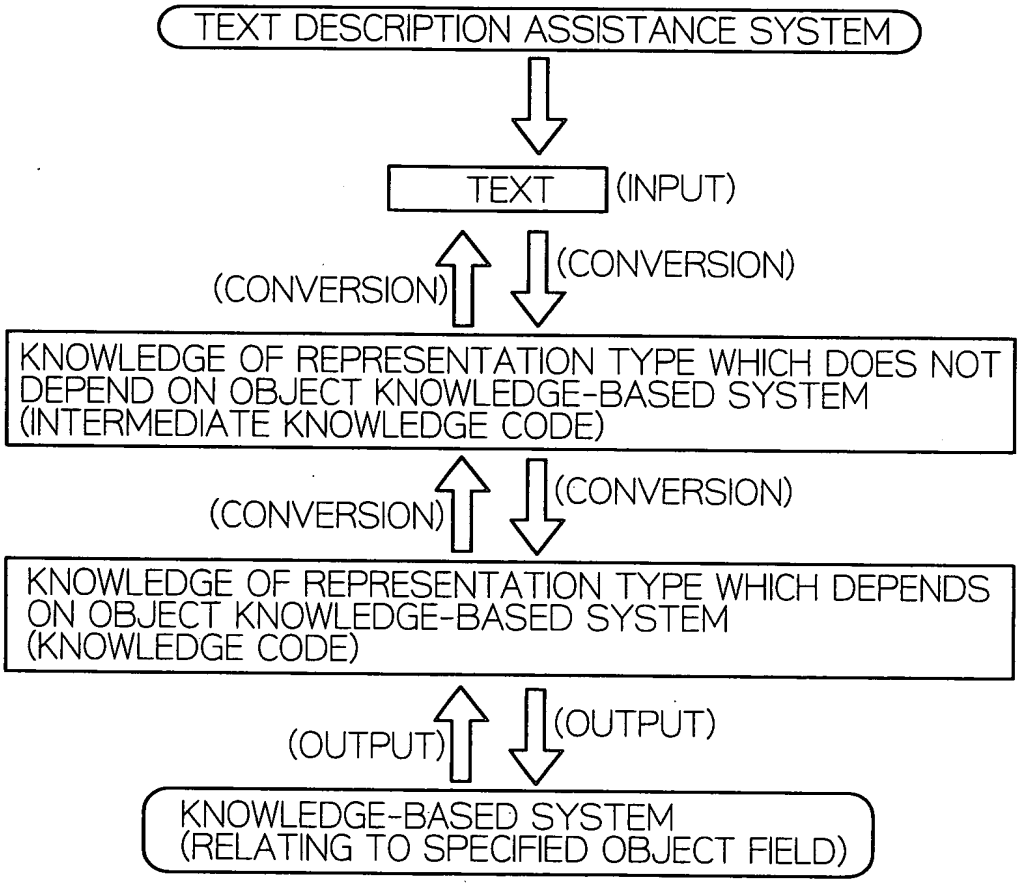

TEXT DESCRIPTION ASSISTANCE SYSTEM
TEXT
(INPUT)
(CONVERSION)
(CONVERSION)
KNOWLEDGE OF REPRESENTATION TYPE WHICH DOES NOT DEPEND ON OBJECT KNOWLEDGE-BASED SYSTEM (INTERMEDIATE KNOWLEDGE CODE)
(CONVERSION)
(CONVERSION)
KNOWLEDGE OF REPRESENTATION TYPE WHICH DEPENDS ON OBJECT KNOWLEDGE-BASED SYSTEM (KNOWLEDGE CODE)
(OUTPUT)
(OUTPUT)
KNOWLEDGE-BASED SYSTEM (RELATING TO SPECIFIED OBJECT FIELD)

FIG. 4

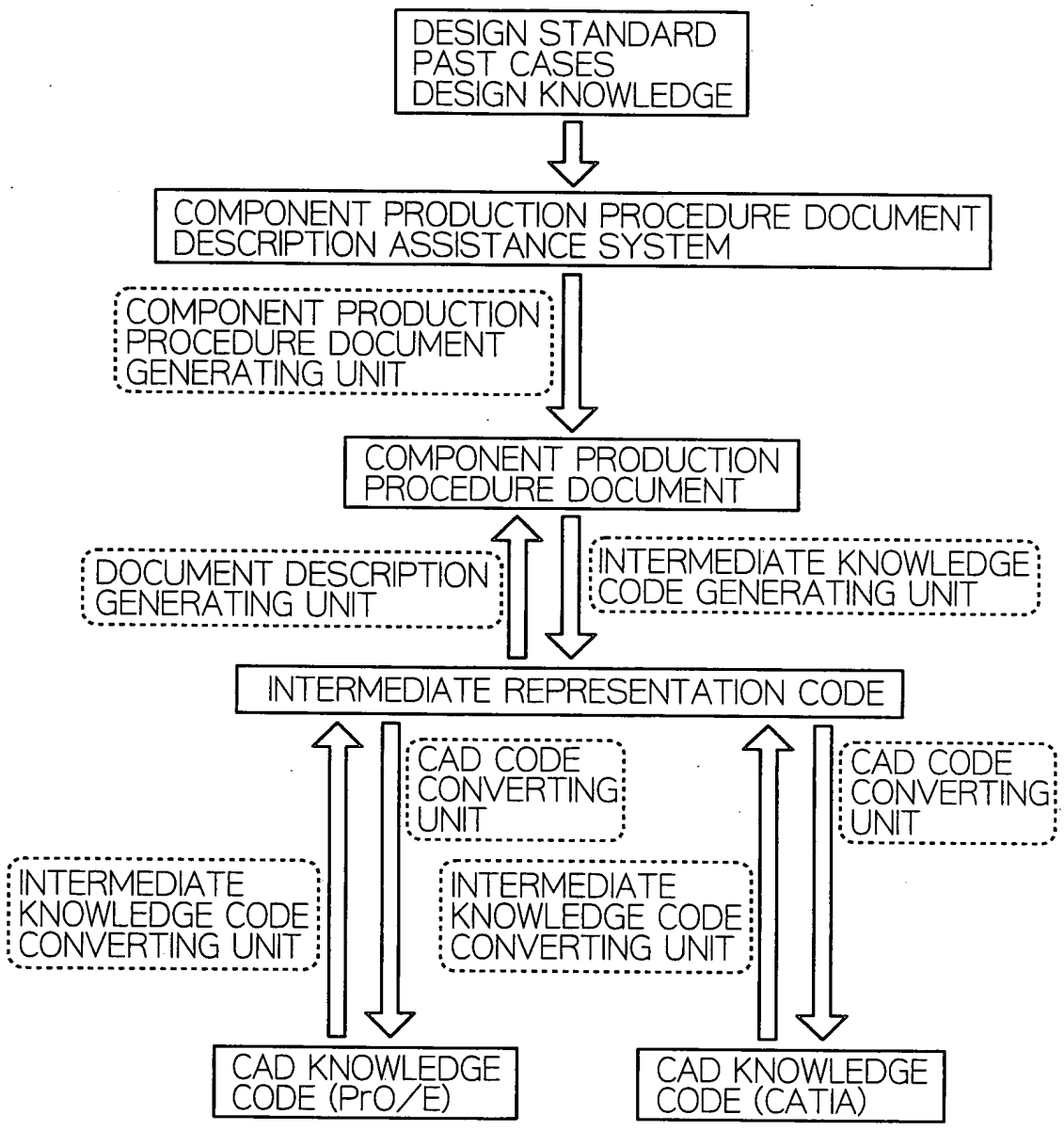

DESIGN STANDARD
PAST CASES
DESIGN KNOWLEDGE
COMPONENT PRODUCTION PROCEDURE DOCUMENT DESCRIPTION ASSISTANCE SYSTEM
COMPONENT PRODUCTION PROCEDURE DOCUMENT GENERATING UNIT
COMPONENT PRODUCTION PROCEDURE DOCUMENT
DOCUMENT DESCRIPTION GENERATING UNIT
INTERMEDIATE KNOWLEDGE CODE GENERATING UNIT
INTERMEDIATE REPRESENTATION CODE
CAD CODE CONVERTING UNIT
CAD CODE CONVERTING UNIT
INTERMEDIATE KNOWLEDGE CODE CONVERTING UNIT
INTERMEDIATE KNOWLEDGE CODE CONVERTING UNIT
CAD KNOWLEDGE CODE (PrO/E)
CAD KNOWLEDGE CODE (CATIA)

FIG. 5

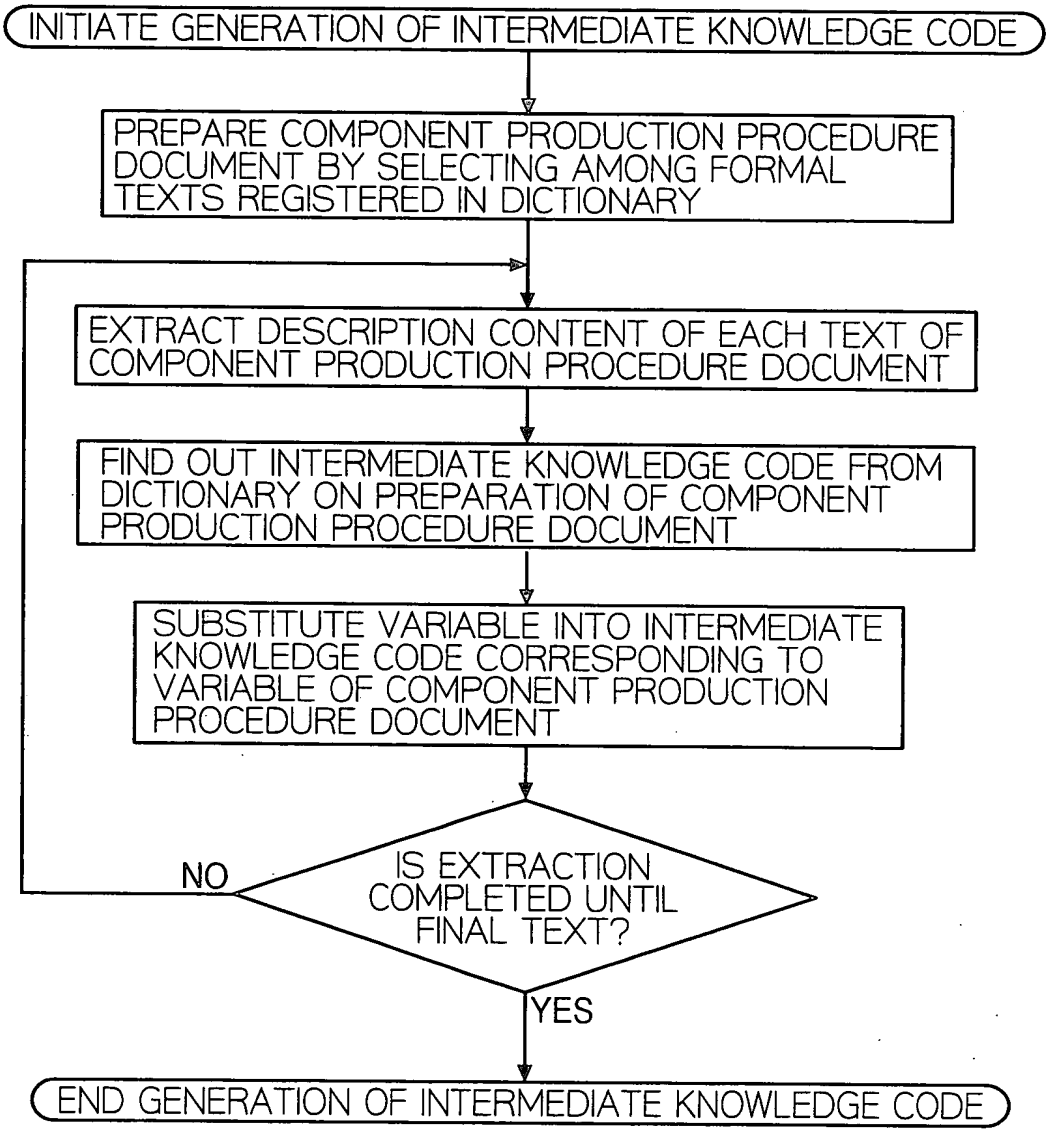

INITIATE GENERATION OF INTERMEDIATE KNOWLEDGE CODE
PREPARE COMPONENT PRODUCTION PROCEDURE DOCUMENT BY SELECTING AMONG FORMAL TEXTS REGISTERED IN DICTIONARY
EXTRACT DESCRIPTION CONTENT OF EACH TEXT OF COMPONENT PRODUCTION PROCEDURE DOCUMENT
FIND OUT INTERMEDIATE KNOWLEDGE CODE FROM DICTIONARY ON PREPARATION OF COMPONENT PRODUCTION PROCEDURE DOCUMENT
SUBSTITUTE VARIABLE INTO INTERMEDIATE KNOWLEDGE CODE CORRESPONDING TO VARIABLE OF COMPONENT PRODUCTION PROCEDURE DOCUMENT
IS EXTRACTION COMPLETED UNTIL FINAL TEXT?
NO
YES
END GENERATION OF INTERMEDIATE KNOWLEDGE CODE

FIG. 6

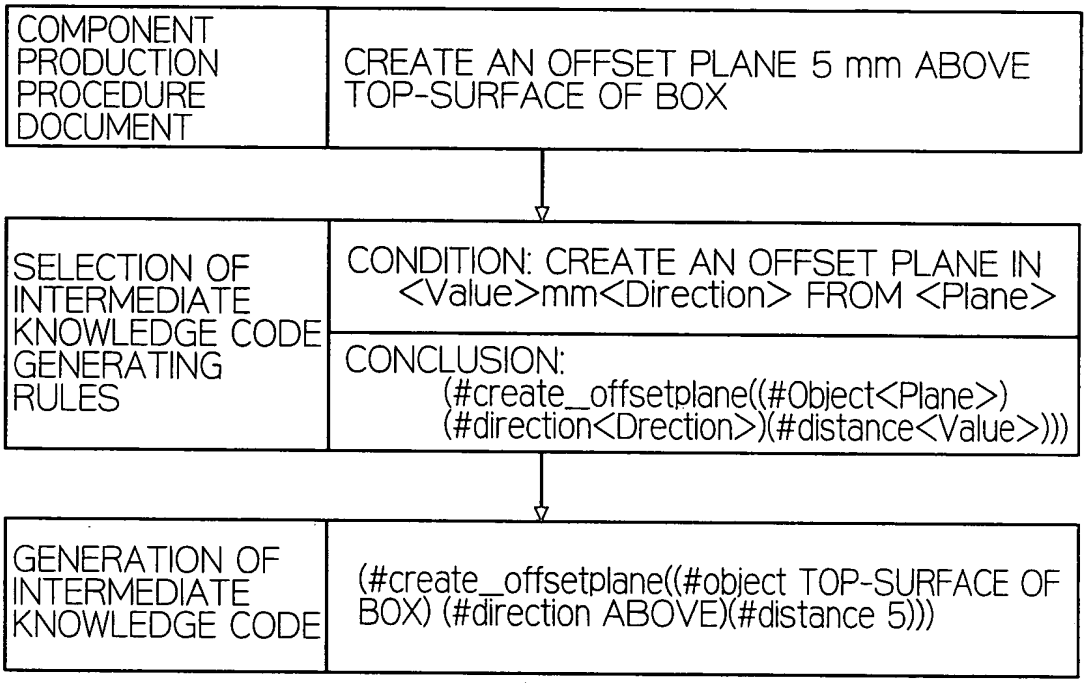

COMPONENT PRODUCTION PROCEDURE DOCUMENT
CREATE AN OFFSET PLANE 5 mm ABOVE TOP-SURFACE OF BOX
SELECTION OF INTERMEDIATE KNOWLEDGE CODE GENERATING RULES
CONDITION: CREATE AN OFFSET PLANE IN <Value>mm<Direction> FROM <Plane>
CONCLUSION: (#create_offsetplane((#Object<Plane>) (#direction<Drection>)(#distance<Value>)))
GENERATION OF INTERMEDIATE KNOWLEDGE CODE
(#create_offsetplane((#object TOP-SURFACE OF BOX) (#direction ABOVE)(#distance 5)))

FIG. 7

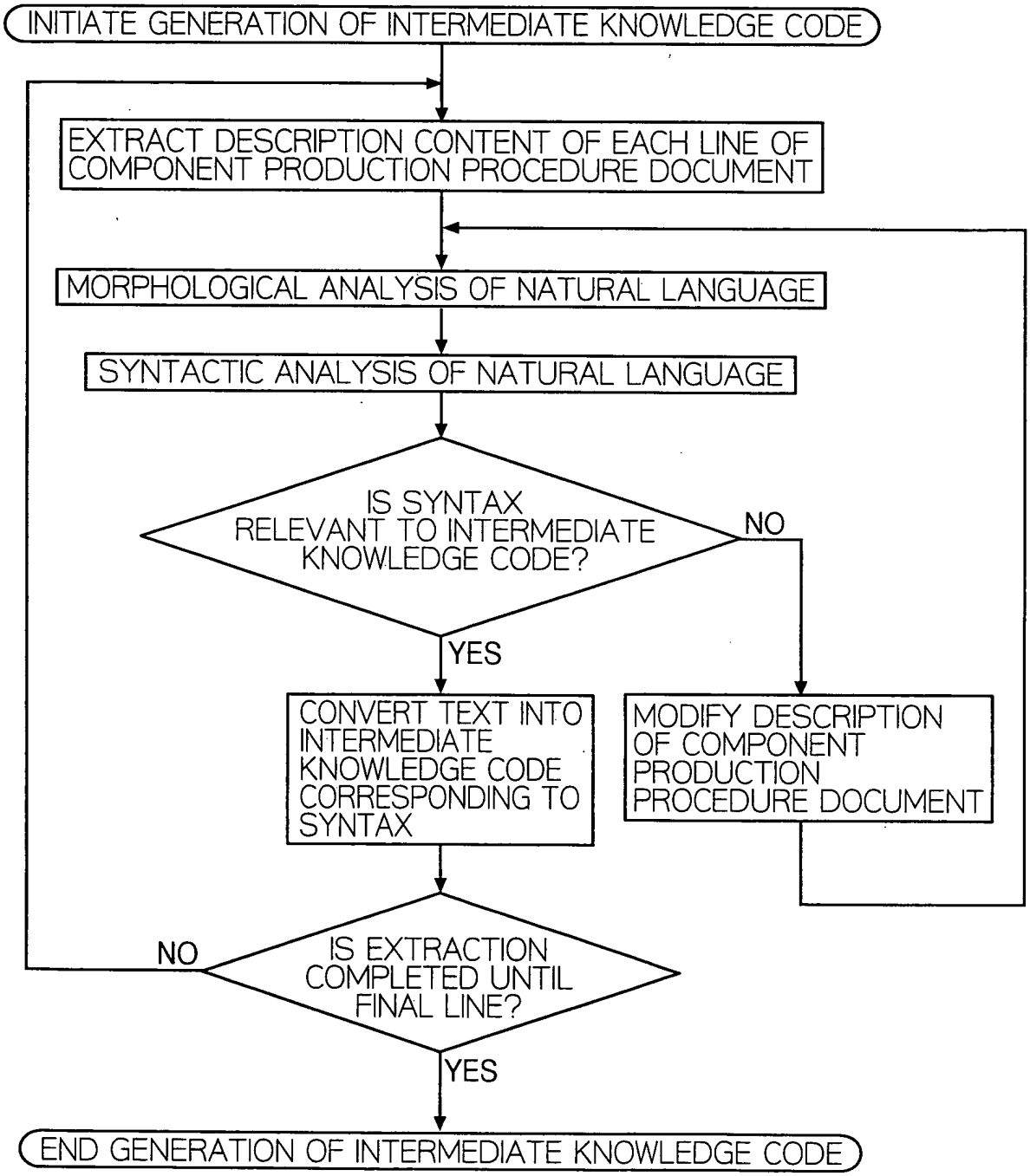

INITIATE GENERATION OF INTERMEDIATE KNOWLEDGE CODE
EXTRACT DESCRIPTION CONTENT OF EACH LINE OF COMPONENT PRODUCTION PROCEDURE DOCUMENT
MORPHOLOGICAL ANALYSIS OF NATURAL LANGUAGE
SYNTACTIC ANALYSIS OF NATURAL LANGUAGE
IS SYNTAX RELEVANT TO INTERMEDIATE KNOWLEDGE CODE?
NO
YES
CONVERT TEXT INTO INTERMEDIATE KNOWLEDGE CODE CORRESPONDING TO SYNTAX
MODIFY DESCRIPTION OF COMPONENT PRODUCTION PROCEDURE DOCUMENT
NO
IS EXTRACTION COMPLETED UNTIL FINAL LINE?
YES
END GENERATION OF INTERMEDIATE KNOWLEDGE CODE

FIG. 8

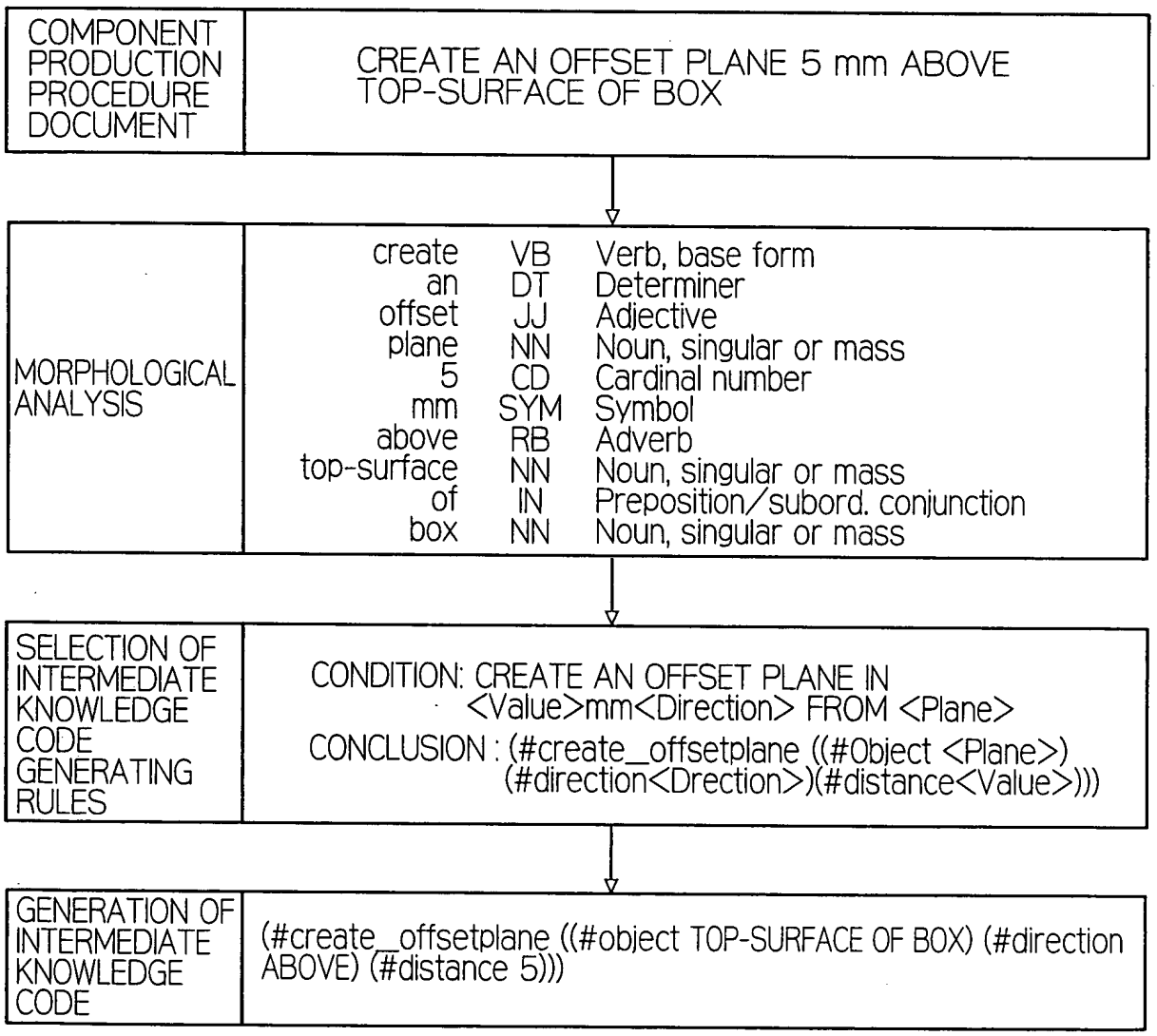

COMPONENT PRODUCTION PROCEDURE DOCUMENT
CREATE AN OFFSET PLANE 5 mm ABOVE TOP-SURFACE OF BOX
MORPHOLOGICAL ANALYSIS
create VB Verb, base form
an DT Determiner
offset JJ Adjective
plane NN Noun, singular or mass
5 CD Cardinal number
mm SYM Symbol
above RB Adverb
top-surface NN Noun, singular or mass
of IN Preposition/subord. conjunction
box NN Noun, singular or mass
SELECTION OF INTERMEDIATE KNOWLEDGE CODE GENERATING RULES
CONDITION: CREATE AN OFFSET PLANE IN <Value>mm<Direction> FROM <Plane>
CONCLUSION : (#create_offsetplane ((#Object <Plane>) (#direction<Drection>)(#distance<Value>)))
GENERATION OF INTERMEDIATE KNOWLEDGE CODE
(#create_offsetplane ((#object TOP-SURFACE OF BOX) (#direction ABOVE) (#distance 5)))

FIG. 9

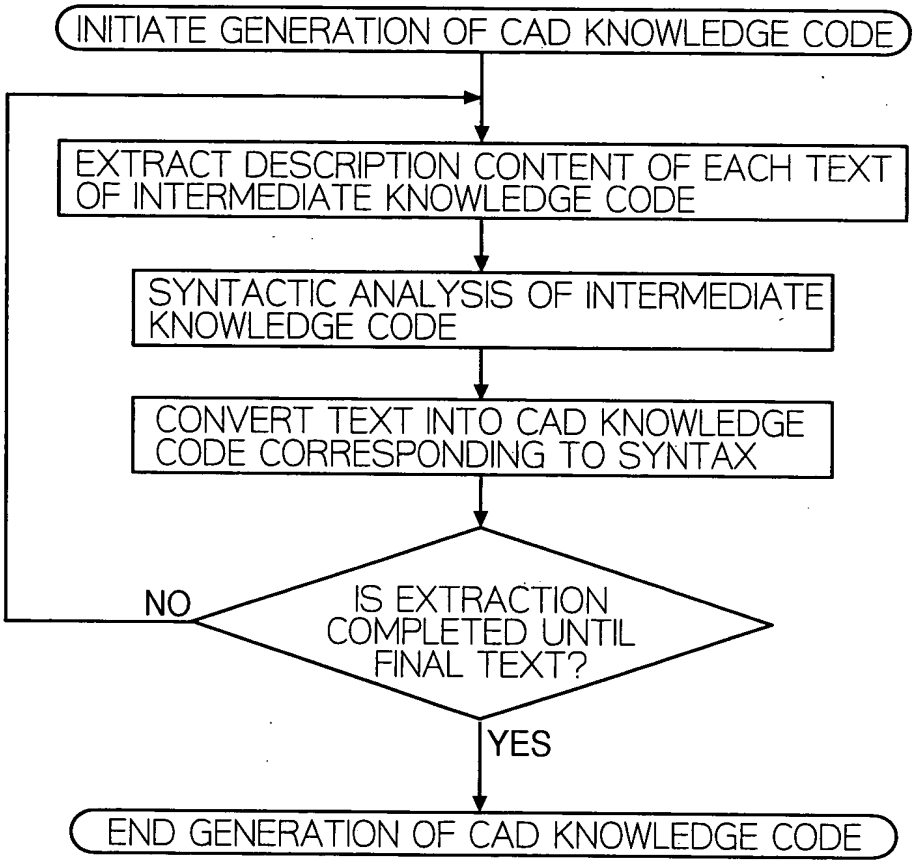

INITIATE GENERATION OF CAD KNOWLEDGE CODE
EXTRACT DESCRIPTION CONTENT OF EACH TEXT OF INTERMEDIATE KNOWLEDGE CODE
SYNTACTIC ANALYSIS OF INTERMEDIATE KNOWLEDGE CODE
CONVERT TEXT INTO CAD KNOWLEDGE CODE CORRESPONDING TO SYNTAX
IS EXTRACTION COMPLETED UNTIL FINAL TEXT?
NO
YES
END GENERATION OF CAD KNOWLEDGE CODE

FIG. 10

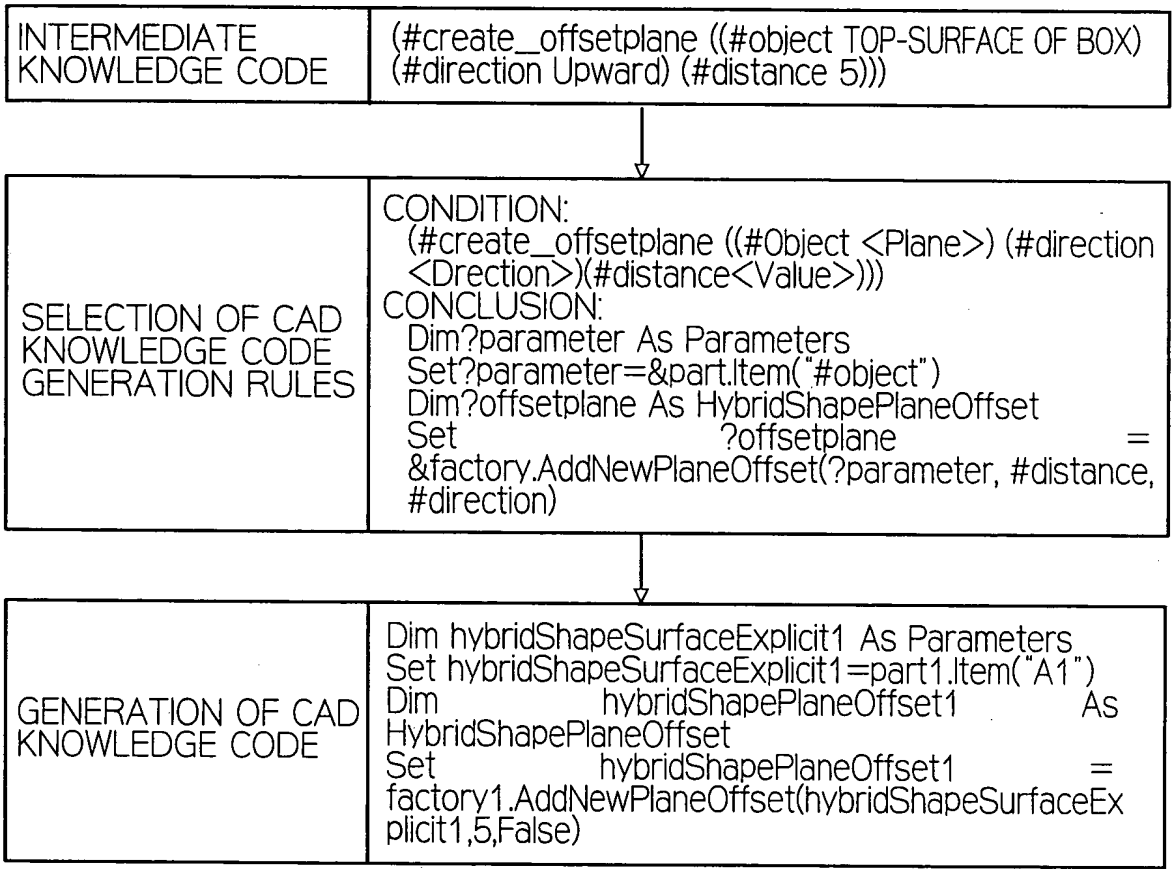

INTERMEDIATE KNOWLEDGE CODE
(#create_offsetplane ((#object TOP-SURFACE OF BOX) (#direction Upward) (#distance 5)))
SELECTION OF CAD KNOWLEDGE CODE GENERATION RULES
CONDITION:
(#create_offsetplane ((#Object <Plane>) (#direction <Drection>)(#distance<Value>)))
CONCLUSION:
Dim?parameter As Parameters
Set?parameter=&part.Item("#object")
Dim?offsetplane As HybridShapePlaneOffset
Set ?offsetplane = &factory.AddNewPlaneOffset(?parameter, #distance, #direction)
GENERATION OF CAD KNOWLEDGE CODE
Dim hybridShapeSurfaceExplicit1 As Parameters
Set hybridShapeSurfaceExplicit1=part1.Item("A1")
Dim hybridShapePlaneOffset1 As HybridShapePlaneOffset
Set hybridShapePlaneOffset1 = factory1.AddNewPlaneOffset(hybridShapeSurfaceExplicit1,5,False)

FIG. 11

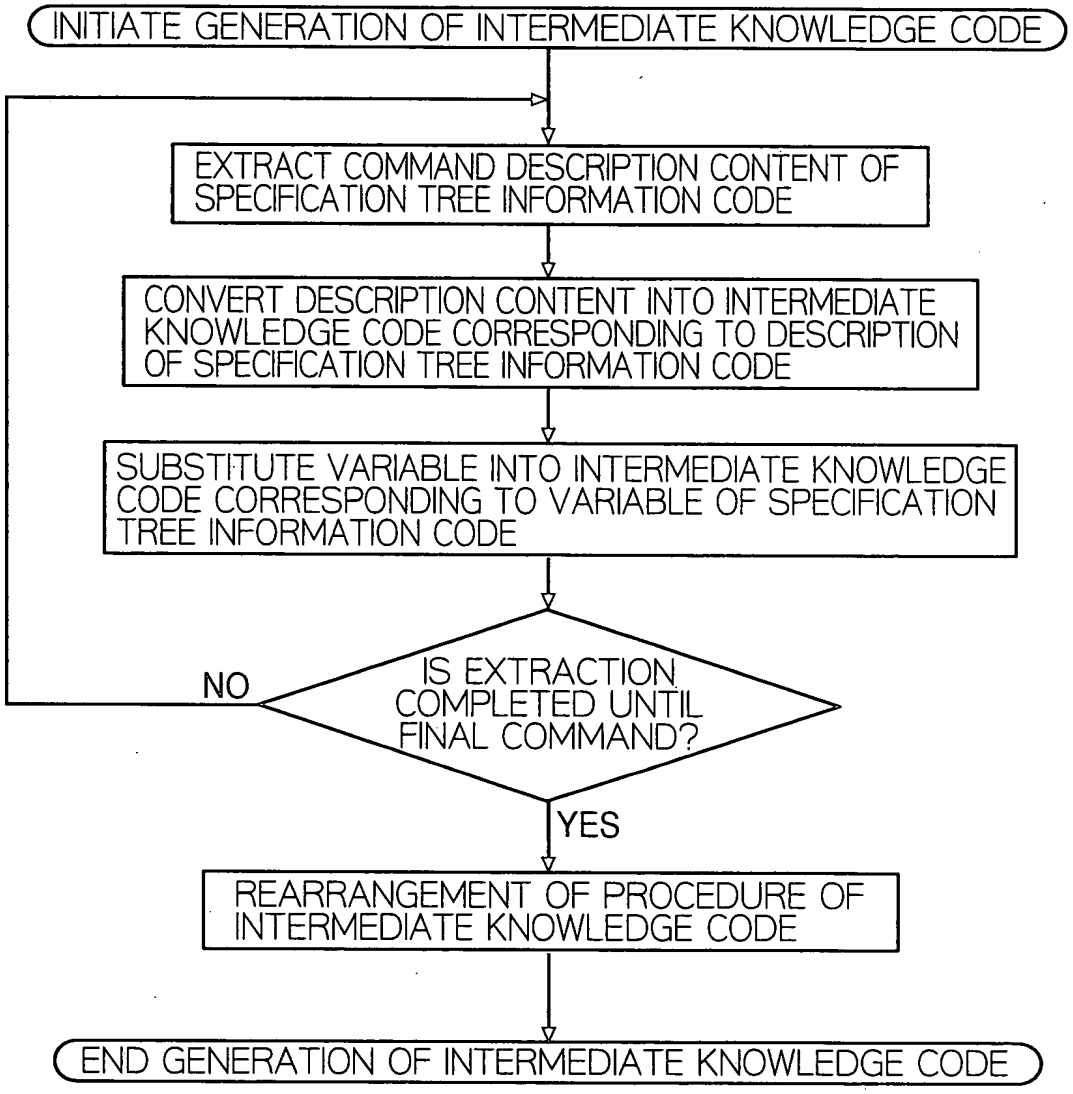

INITIATE GENERATION OF INTERMEDIATE KNOWLEDGE CODE
EXTRACT COMMAND DESCRIPTION CONTENT OF SPECIFICATION TREE INFORMATION CODE
CONVERT DESCRIPTION CONTENT INTO INTERMEDIATE KNOWLEDGE CODE CORRESPONDING TO DESCRIPTION OF SPECIFICATION TREE INFORMATION CODE
SUBSTITUTE VARIABLE INTO INTERMEDIATE KNOWLEDGE CODE CORRESPONDING TO VARIABLE OF SPECIFICATION TREE INFORMATION CODE
IS EXTRACTION COMPLETED UNTIL FINAL COMMAND?
NO
YES
REARRANGEMENT OF PROCEDURE OF INTERMEDIATE KNOWLEDGE CODE
END GENERATION OF INTERMEDIATE KNOWLEDGE CODE

FIG. 12

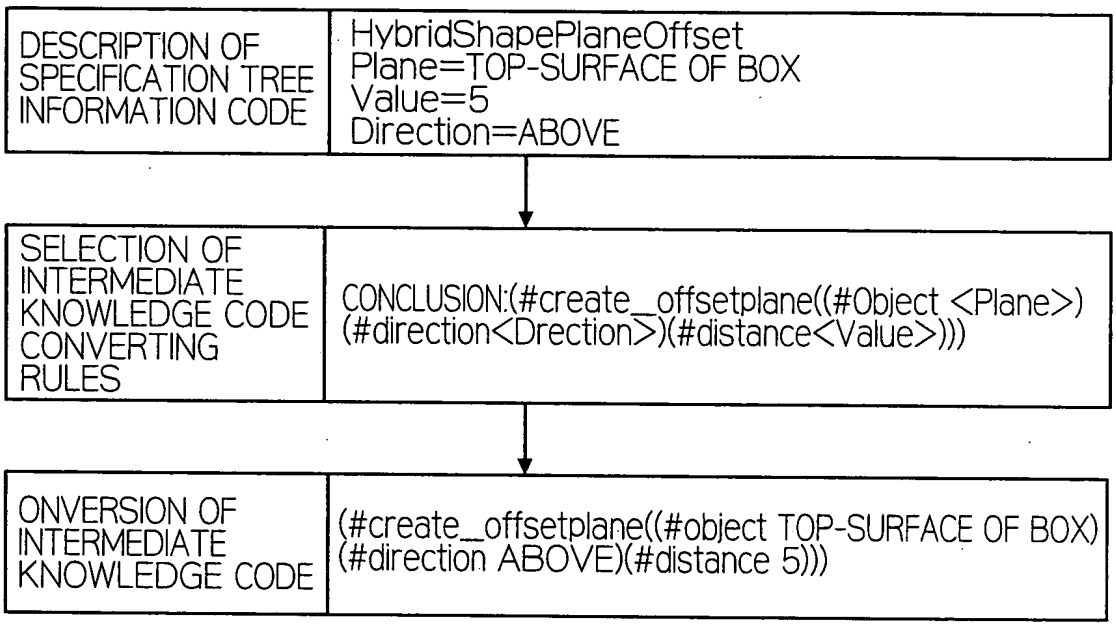

DESCRIPTION OF SPECIFICATION TREE INFORMATION CODE
HybridShapePlaneOffset
Plane=TOP-SURFACE OF BOX
Value=5
Direction=ABOVE
SELECTION OF INTERMEDIATE KNOWLEDGE CODE CONVERTING RULES
CONCLUSION:(#create_offsetplane((#Object <Plane>)
(#direction<Drection>)(#distance<Value>)))
ONVERSION OF INTERMEDIATE KNOWLEDGE CODE
(#create_offsetplane((#object TOP-SURFACE OF BOX)
(#direction ABOVE)(#distance 5)))

FIG. 13

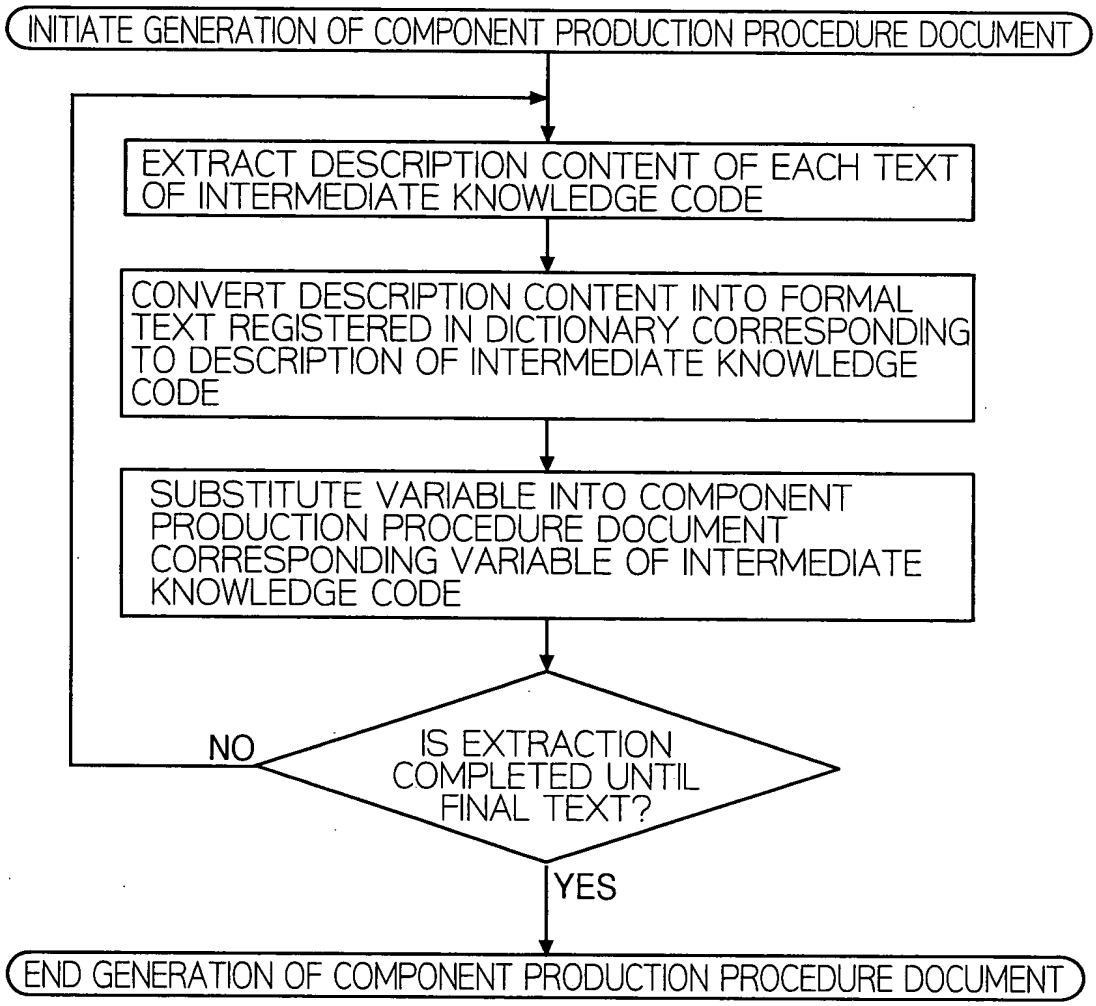

INITIATE GENERATION OF COMPONENT PRODUCTION PROCEDURE DOCUMENT
EXTRACT DESCRIPTION CONTENT OF EACH TEXT OF INTERMEDIATE KNOWLEDGE CODE
CONVERT DESCRIPTION CONTENT INTO FORMAL TEXT REGISTERED IN DICTIONARY CORRESPONDING TO DESCRIPTION OF INTERMEDIATE KNOWLEDGE CODE
SUBSTITUTE VARIABLE INTO COMPONENT PRODUCTION PROCEDURE DOCUMENT CORRESPONDING VARIABLE OF INTERMEDIATE KNOWLEDGE CODE
IS EXTRACTION COMPLETED UNTIL FINAL TEXT?
NO
YES
END GENERATION OF COMPONENT PRODUCTION PROCEDURE DOCUMENT

FIG. 14

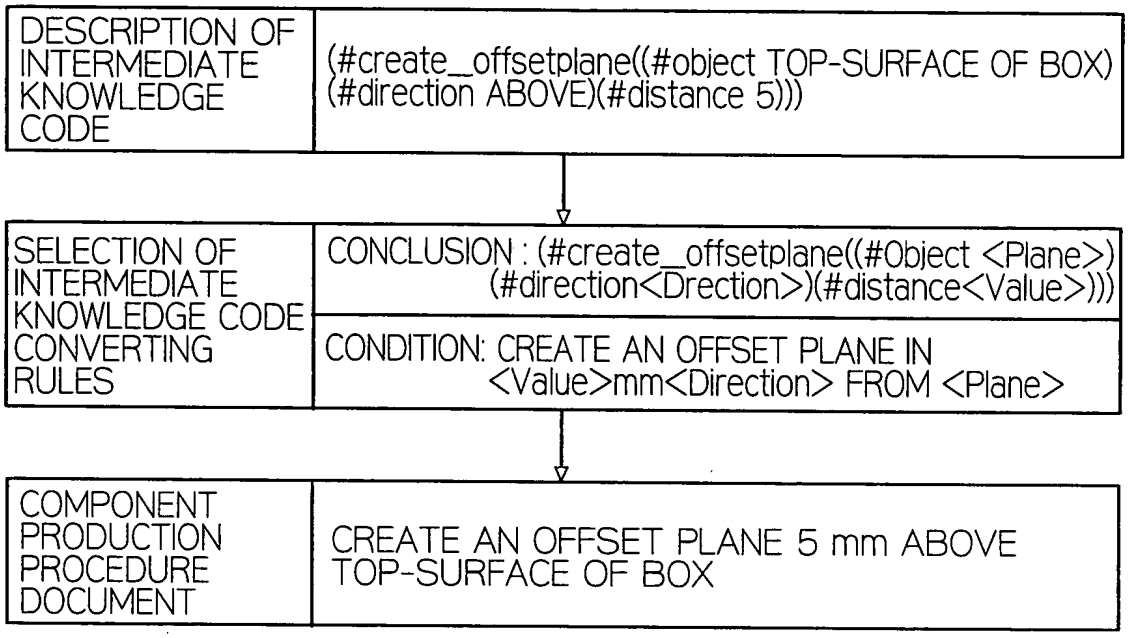
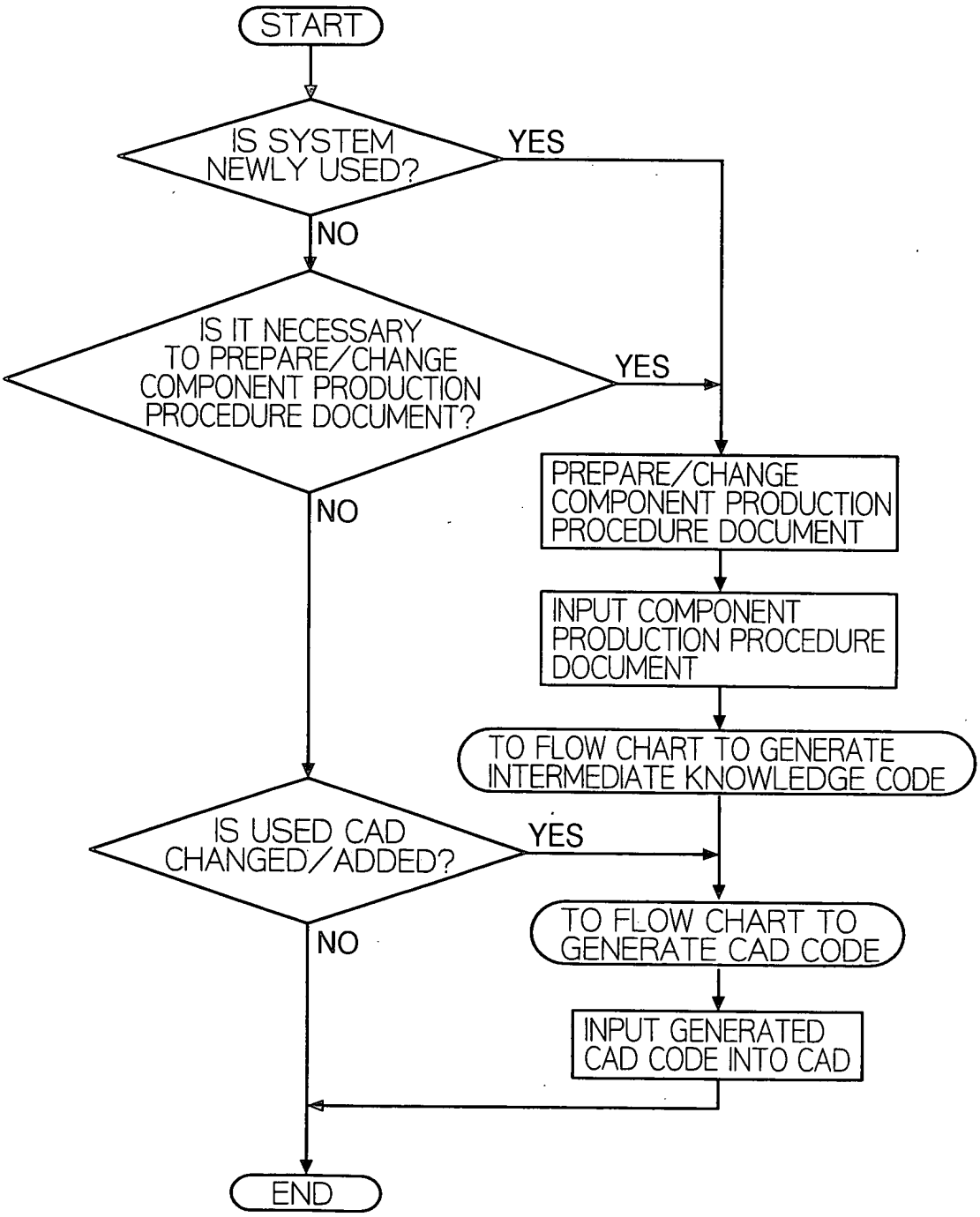

DESCRIPTION OF INTERMEDIATE KNOWLEDGE CODE
(#create_offsetplane((#object TOP-SURFACE OF BOX) (#direction ABOVE)(#distance 5)))
SELECTION OF INTERMEDIATE KNOWLEDGE CODE CONVERTING RULES
CONCLUSION : (#create_offsetplane((#Object <Plane>) (#direction<Drection>)(#distance<Value>)))
CONDITION: CREATE AN OFFSET PLANE IN <Value>mm<Direction> FROM <Plane>
COMPONENT PRODUCTION PROCEDURE DOCUMENT
CREATE AN OFFSET PLANE 5 mm ABOVE TOP-SURFACE OF BOX

FIG. 15


START
IS SYSTEM NEWLY USED?
YES
NO
IS IT NECESSARY TO PREPARE/CHANGE COMPONENT PRODUCTION PROCEDURE DOCUMENT?
YES
NO
PREPARE/CHANGE COMPONENT PRODUCTION PROCEDURE DOCUMENT
INPUT COMPONENT PRODUCTION PROCEDURE DOCUMENT
TO FLOW CHART TO GENERATE INTERMEDIATE KNOWLEDGE CODE
IS USED CAD CHANGED/ADDED?
YES
NO
TO FLOW CHART TO GENERATE CAD CODE
INPUT GENERATED CAD CODE INTO CAD
END